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PATHOLOGY OF *Amphimerus elongatus* (DIGENEA: OPISTHORCHIIDAE) IN THE LIVER OF THE DOUBLE-CRESTED CORMORANT

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Abstract: A Double-crested Cormorant, *Phalacrocorax auritus*, was found infected with the opisthorchiid trematode, *Amphimerus elongatus*. The liver was badly riddled with a massive infection of thousands of these parasites. Histologically, trematodes were found in the bile ducts of almost all the lobules of the liver. These were completely occluded and there was hyperplasia or complete desquamation of the epithelium of the duct walls. In areas which contained numerous parasites there was extensive fibrosis. In lobules which were free of the parasites the hepatic cells exhibited cloudy swelling, their nuclei were karyolytic in areas adjacent to fibrosis, and there was a considerable increase in the periportal tissue. A localized inflammatory response was noted with lymphocytes and eosinophils as the main cellular components. This is the first record of *A. elongatus* from the Double-crested Cormorant.

INTRODUCTION

A specimen of the Double-crested Cormorant, *Phalacrocorax auritus*, was found infected with the liver fluke, *Amphimerus elongatus*. Although reported previously from several species of aquatic birds from North America, this is the first record from this host. The unique pathological lesions and host-parasite relationships of this trematode infection are discussed.

MATERIALS AND METHODS

As part of a study of the helminth and acarid parasites of birds in Louisiana several specimens of the Double-crested Cormorant were collected from the Rockefeller Wildlife Refuge in southwestern Louisiana. These were examined within an hour after death and, upon necropsy, the liver of a single adult bird was found badly riddled with a massive trematode infection. After several unsuccessful attempts were made to remove intact worms, the entire liver was cut into small pieces, fixed in 10% formalin, and later embedded in paraffin, sectioned, and stained in hematoxylin and eosin.

Pieces of trematodes were dissected free of the tissue and prepared as whole mounts for species identification.

RESULTS

Identification

The trematodes from the cormorant appear to be very similar to those described from *Megaceryle alcyon*, the Belted Kingfisher, from Massachusetts and Canada by Boyd and Fry.¹ Since specimens from both these hosts exhibit intermediate characteristics between *Amphimerus elongatus* and *A. lintoni* they are considered as conspecific and regarded herein as *A. elongatus* since this name has priority.

Gross Pathology

The liver was firm, enlarged, mottled yellow-red and black, and contained thousands of trematodes, many of which were visible just beneath the surface. They appeared to be in the bile ducts and were often seen lying side by side or

folded upon themselves. Smears from the cut surface of the liver prior to fixation revealed operculate eggs characteristic of the Oposthorchiidae. These flukes were not found in the gall bladder, common bile duct, pancreas, or any other body organ of this host.

Histopathology

Histological examination revealed trematodes in the bile ducts of almost all the lobules of the liver (Figs. 1, 2). The portal triads were disrupted and the bile ducts were completely occluded and greatly distended. There was hyperplasia to complete desquamation of the duct walls and hepatic cell nuclei in these areas were karyolytic and often stacked one upon another.

In sections which contained numerous parasites, there was extensive fibrosis with fibrous tissue replacing the hepatic parenchymal cells. There was a localized inflammatory response with eosinophils and lymphocytes as the main cellular components usually near the parasites or adjacent to areas of fibrosis (Fig. 2).

In a few lobules which were free of trematodes, hepatic cells usually exhibited a cloudy swelling and in some instances fatty degeneration and atrophy toward the center of the lobule. In such areas there was also a considerable increase in the fibrous tissue of the periportal spaces.

The essential histopathological features of this infection appeared to result from the initial occlusion and disruption of the bile ducts by the parasites which caused hyperplasia to complete desquamation of the duct walls, pressure necrosis and atrophy of adjacent parenchymal tissue, and subsequent fibrosis.

DISCUSSION

Gower² described *Amphimerus elongatus* from the liver and pancreas of several species of ducks and swans from Michigan. A second species, *Amphimerus lintoni*, was subsequently described by

Gower³ from the Common Loon, *Gavia immer*. Boyd and Fry¹ found forms which were intermediate between these described species from the Belted Kingfisher and concluded that there were conspecific and should be regarded as a single species, *A. elongatus*. The present study confirms this on the basis of specimens collected from the cormorant.

Although Gower² studied the pathology of *A. elongatus* in the pancreas of ducks, the liver was found to be less heavily infected and in many cases not infected at all. In the pancreas there was some occlusion and thickening of the duct wall. Boyd and Fry¹ noted that the bile ducts of four infected Belted Kingfishers were distended and blocked. The majority of the parasites were found in the liver and not in the pancreas in these hosts. These differences in location may result from host variation and intensity of infection.

Gower² concluded that these parasites might be of some economic importance in waterfowl and noted that this infection, especially when superimposed on other debilitating factors, is capable of causing death in these birds. Certainly, the almost complete blockage of the portal ducts and the extensive cirrhosis of liver of the bird examined in this study would undoubtedly lead to a lowered vitality and eventual death.

The pathological features noted herein are similar to those of certain opisthorchiid infections in other hosts such as *Clonorchis sinensis* and *Opisthorchis felineus* in carnivorous mammals and man. The main lesions in all these infections appear to result from the occlusion and disruption of the portal triads by the parasites which causes hyperplasia and/or desquamation of the duct epithelium, fatty degeneration of the adjacent hepatic cells, extensive fibrosis of periportal spaces, and a localized inflammatory response. Depending on the number of parasites present, this leads to varying degrees of obstructive biliary cirrhosis with proportional liver dysfunction and possible death of the host.

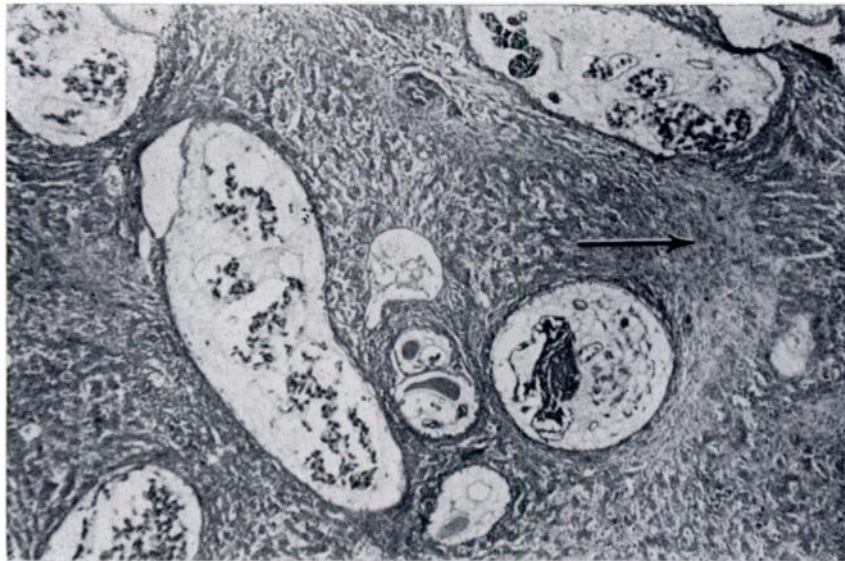


FIGURE 1. Liver of Double-crested Cormorant with *Amphimerus elongatus* in bile ducts with adjacent areas of necrotic hepatic cells and proliferating fibrous tissue of periportal spaces (arrow). X-40.

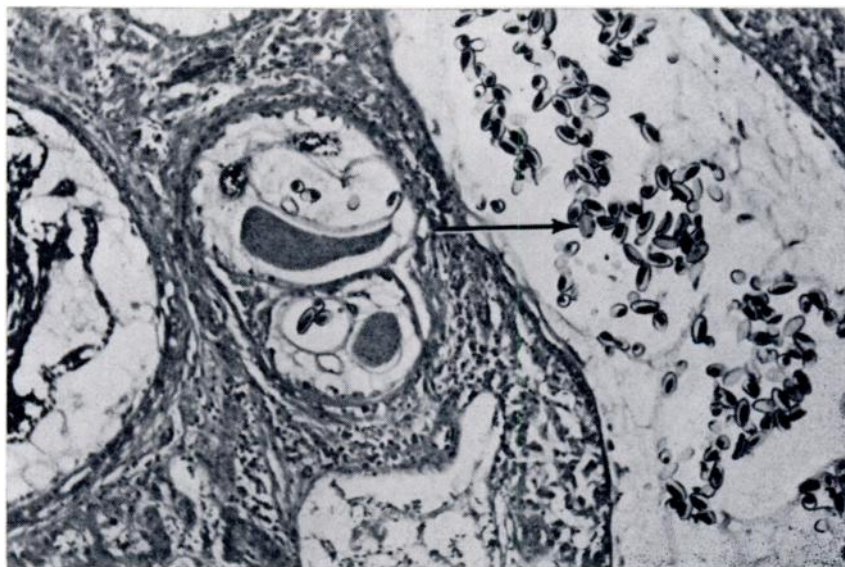


FIGURE 2. Section of liver with localized inflammatory response adjacent to parasites. Note uterus of trematode containing numerous eggs (arrow). X 100.

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